MEDDELELSER

FRA

DET NORSKE SKOGFORSØKSVESEN

NR. 59
(BIND XVII HEFTE 1)

Reports of
The Norwegian Forest Research Institute

VOLLEBEKK 1961

cand
COMMONWEALTH MYCOLOGICAL
4 SEP 1961

Innhold

Side

N. Fabritius Buchwald, V. Kujala, F. Roll-Hansen, E. Björkmann, Aino Käärik:

Lists of Parasitical Fungi and of Hosts of such Fungi. Denmark, Finland, Norway, Sweden. I. *Pinus*, *Populus*, *Quercus* 1

F. Roll-Hansen:

Microsphaera hypophylla Nevodovskij (*M. silvatica* Vlasov), an Oak Powdery Mildew Fungus 37

Microsphaera hypophylla Nevodovskij (*M. silvatica Vlasov*), *en eikemjøldoggsopp* *54*

NORWEGIAN FOREST RESEARCH INSTITUTE, VOLLEBEKK, NORWAY

Lists of Parasitical Fungi and of Hosts of such Fungi

Denmark, Finland, Norway, Sweden

I

Pinus, Populus, Quercus

For IUFRO

by

N. Fabritius Buchwald, V. Kujala, F. Roll-Hansen,
E. Björkman, Aino Käärik

VOLLEBEKK 1961

Contents

Page

Preface 5

Abbreviations 7

A. List of Fungi 8

B. List of Hosts 24

Digitized by the Internet Archive
in 2025

https://archive.org/details/meddelelser-fra-det-norske-skogforsoksvesen_1961_17_1

Preface

Since 1957, the International Union of Forest Research Organizations, Sect. 24, has a working group studying what can be done about forest tree diseases that might be dangerous if the pathogen moved great distances, as from one continent to another. The group was agreed to limit the scope of the work initially to a few genera of forest trees. In 1958, it was proposed to start with the diseases of the genera *Pinus*, *Populus*, and *Quercus*.

For Denmark, Finland, Norway, and Sweden separate lists were written as follows:

Denmark by Professor Dr. N. FABRITIUS BUCHWALD,
Finland by Professor Dr. VILJO KUJALA,
Norway by Forest Pathologist FINN ROLL-HANSEN,
Sweden by Professor Dr. ERIK BJÖRKMAN and Dr. AINO KÄÄRIK.

On the basis of these lists, a joint list of parasitical fungi on species of the genera *Pinus*, *Populus*, and *Quercus*, and a list of the hosts of the fungi have been made. I am responsible for working together the separate lists into the two joint lists, and also for the nomenclature.

In Denmark, the lists are primarely based on specimens preserved i the collections of the Department of Plant Pathology of the Royal Veterinary and Agricultural College, Copenhagen, and further on the works of J. LIND: Danish Fungi as represented in the herbarium of E. ROSTRUP (1913) and of C. FERDINANDSEN & C. A. JØRGENSEN: Skovtræernes Sygdomme (1938–39).

In Finland, the work is based on the mycological herbarium of the Forest Research Institute of Finland and also on observations made by Dr. VILJO KUJALA.

In Norway, the lists are mainly based on herbarium specimens preserved in the Botanical Museum of the University of Oslo. The greater part of this herbarium has been critically examined by Dr. I. JØRSTAD, whose papers have been extremely useful. Material preserved at the Norwegian Plant Protection Institute and at the Norwegian Forest Research Institute has also been used.

In Sweden, the work is based on the mycological herbaria at the Royal School of Forestry and at the Forest Research Institute of Sweden; further on Fungi Exsiccati Suecici by S. LUNDELL and J. A. NANNFELDT, and on Enumeratio Uredinearum Scandinavicarum by N. HYLANDER, I. JØRSTAD and J. A. NANNFELDT.

In the lists of species of parasitical fungi for each combination of fungus and host the country where this combination has been found is given. For each fungus importance and dangerousness are indicated by asterisks, separately for each country. If a fungus is considered a parasite on *Pinus*, *Populus*, or *Quercus* in one country, and known from another country, where it is not considered a parasite on *Pinus*, *Populus*, or *Quercus*, then the latter country is not given for the combinations of fungus and hosts, but only generally indicated in round brackets after the name of the fun-

NORWEGIAN FOREST RESEARCH INSTITUE,
VOLLEBEKK, NORWAY

January 1961 Finn Roll-Hansen

Abbreviations

***	Of great importance. Dangerous.
**	Of some importance. May be dangerous.
*	Of no importance. Not dangerous.

D	Denmark
F	Finland
N	Norway
S	Sweden
n	northern
s	southern

A. List of Fungi

Apiognomonia quercina (Kleb.) Höhn. (in F, N, S only the imperfect stage: *Gloeosporium quercinum West.)* D**, F*, N*, S*
  Quercus petraea – D
  Q. robur – D, F, Ns, Ss

Armillaria mellea (Vahl ex Fr.) Quél. D***, F***, N***, S**
  Pinus cembra – D
  P. contorta var. *latifolia* – D
  P. halepensis – D
  P. mugo – D
  P. nigra – D
  P. strobus – D
  P. sylvestris – D, F, N, S
  Populus deltoides – D
  P. deltoides × *P. nigra* (*P.* × *canadensis*) – D
  P. tremula – N
  P. trichocarpa – D
  Quercus robur – D
  Q. rubra (*Q. borealis*) – D

Botrytis cinerea Pers. ex Fr. (D), (F), (N), S*
  Pinus sylvestris – S

Cenangium ferruginosum Fr. (*C. abietis* Pers. ex Duby) D*, F*, (N), S*
  Pinus banksiana – F
  P. cembra – F
  P. contorta var. *latifolia* – D, F
  P. mugo – D, F
  P. nigra – D

P. peuce – F
P. strobus – F
P. sylvestris – D, F, S

Ciboria batschiana (Zopf) Buchw. (*Sclerotinia pseudotuberosa* (Rehm) Rehm) D**, (S)
Quercus petraea – D
Q. robur – D

C. sydowiana Rehm D*
Quercus robur – D

Coleosporium tussilaginis (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) D**, F**, N**, S*
Pinus echinata – D
P. halepensis – D
P. mugo – D
P. mugo var. *rostrata* – Ns
P. mugo var. *rotundata* – Ns
P. nigra – D, Ns
P. ponderosa – Ns
P. rigida – D
P. sylvestris – D, F, N, S
P. washoënsis – Ns

Colpoma quercina (Pers. ex Fr.) Wallr. (*Clithris quercina* (Pers. ex Fr.) Rehm) (D), F*, (N), S*
Quercus robur – Fs, Ss

Cronartium flaccidum (Alb. & Schw.) Wint. (incl. *Peridermium pini* (Pers.) Lév.) D***, F***, N***, S***
Pinus mugo – D
P. mugo var. *rostrata* – Ns
P. sylvestris – D, F, N, S

C. ribicola J. C. Fisch. D***, F***, N***, S***
Pinus flexilis – D, Ns
P. griffithii – D
P. monticola – D, Fs
P. peuce – Fs, Ns
P. strobus – D, Fs, Ns, S

Crumenula abietina Lagerb. cf. *Scleroderris lagerbergii* Gremmen

C. sororia Karst. D*, F**, S*
Pinus contorta var. *latifolia* – F
P. sylvestris – D, F, S

Cryptodiaporthe populea (Sacc.) Butin D**
Populus laurifolia × *P. nigra* (*P.* × *berolinensis*) – D
P. tremula × *P. tremuloides* – D

Cryptodiaporthe populea (Sacc.) Butin (only the imperfect stage: *Chondroplea populea* (Sacc.) Kleb. (*Dothichiza populea* Sacc. & Bri.)) D***, F**, N**, S**
Populus deltoides var. *angulata* × *P. nigra* var. *plantierensis* (*P.* × *robusta*) – D
P. nigra var. *italica* – Fs, Ns, Ss

Cucurbidothis pithyophila (Fr.) Petr. (*Cucurbitaria pithyophila* (Fr.) de Not.) D*, F*, N*, (S)
Pinus strobus – D
P. sylvestris – D, F, N

Cylindrocarpon radicicola Wr. (N), S*
Pinus sylvestris – S

Cytospora chrysosperma Pers. ex Fr. cf. *Valsa sordida*

Daedalea confragosa Bolt. ex Fr. (*Trametes confragosa* (Bolt. ex Fr.) Jørst.) D*, (F), (N), (S)
Populus sp. – D

D. quercina L. ex Fr. D*, F*, N*, S*
Quercus petraea – Ns, Ss
Q. robur – D, Fs, Ns, Ss

Daldinia concentrica (Fr.) Ces. & de Not. (*D. tuberosa* (Scop.) Schroet.) D*, (F), (N), (S)
Quercus palustris – D

Dasyscypha calyciformis (Willd. ex Wettst.) Rehm D**, (F), N*, S**
Pinus banksiana – S
P. contorta – D
P. contorta var. *latifolia* – D
P. strobus – D
P. sylvestris – D, Ns, S

D. pini (Brunch.) Hahn & Ayers (*D. fuscosanguinea* auct. non Rehm) F***, N**, S**
Pinus sylvestris – Fn, N, Sn

D. resinaria (Cke. & Phill.) Rehm (F), N**, S*
Pinus sylvestris – Ns, S

D. subtilissima (Cke.) Sacc. F**, S**
Pinus banksiana – S
P. contorta var. *latifolia* – F
P. sylvestris – F, S

D. cf. *subtilissima* (Cke.) Sacc. N**
Pinus contorta var. *latifolia* – Ns
P. mugo var. *rostrata* – Ns
P. mugo var. *rotundata* – Ns
P. nigra – Ns
P. sylvestris – Ns

Diaporthe taleola (Fr.) Sacc. D*, S*
Quercus robur – D, S

Discella strobilina (Desm.) Died. (*Ascochyta parasitica* (Hart.) Rostr.) F*, N*, S*
Pinus contorta var. *latifolia* – F, Ns, Ss (In Ns, Ss on 2/0 plants)
P. sylvestris – F

Drepanopeziza populorum (Desm.) Höhn., sensu lato (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) D*, F*, N*, S*
Populus alba – D, Ns, S
P. balsamifera – Ns
P. deltoides – Ns
P. deltoides × *P. nigra* – Ns
P. laurifolia × *P. nigra* (*P.* × *berolinensis*) – Ns
P. nigra – Ns
P. nigra var. *italica* – Ns
P. simonii – D, Ns
P. tremula – F, Nn, S

Dryodon septentrionale Fr. N*, (S)
Populus balsamifera – Ns

Fistulina hepatica Schaeff. ex Fr. D*, F*, N*, S*
  Quercus petraea – Ss
  Q. petraea or *Q. robur* – Ns
  Q. robur – D, Fs, Ss

Fomes annosus (Fr.) Cke. D***, F***, N***, S***
  Pinus banksiana – D
  P. cembra – Ns
  P. contorta – D
  P. contorta var. *latifolia* – D, Fs, Ns, S
  P. mugo – D
  P. mugo var. *rostrata* – Ns
  P. mugo var. *rotundata* – Ns
  P. nigra – D
  P. ponderosa – D
  P. strobus – D
  P. sylvestris – D, Fs, Ns, S
  Populus alba × *P. tremula* (*P.* × *canescens*) – D
  Quercus petraea – S
  Q. petraea or *Q. robur* – Ns
  Q. robur – D, S
  Q. rubra – D, S

F. conchatus (Pers. ex Fr.) Gill. N*, (S)
  Populus sp. – Ns

F. cytisinus (Berk.) Gill. (non *Polyporus fraxineus* Bull. ex Fr. = *Fomes ulmarius* Cke.) D*
  Quercus robur – D

F. fomentarius (L. ex Fr.) Kickx D**, F*, N**, S*
  Populus alba – D
  P. balsamifera – Ns
  P. deltoides – D
  P. deltoides × *P. nigra* (*P.* × *canadensis*) – D
  P. tremula – F, Ns, S
  Quercus robur – D, F

F. igniarius (L. ex Fr.) Kickx D***, (F), N**, S**
  Populus alba – D, Ns, S

P. alba × *P. tremula* (*P.* ×*canescens*) – D
P. balsamifera – Ns

F. igniarius (L. ex Fr.) Kickx var. *populinus* (Neuman) Campbell D**, F***, N***, S**
Populus tremula – D, F, N, S

F. odoratus (Wulf. ex Fr.) Karst. D*, (F), (N), (S)
Pinus sylvestris – D

F. pini (Thore ex Fr.) Karst. D*, F**, N**, S**
Pinus strobus – D
P. sylvestris – D, F, N, S

F. pinicola (Sw. ex Fr.) Cke. D**, F*, N*, S*
Pinus sylvestris – D, F, Ns, S

F. populinus (Schum. ex Fr.) Cke. (*F. connatus* (Weinm.) Gill.) D**, (F), N*, (S)
Populus balsamifera – Ns
P. deltoides – D
P. deltoides × *P. nigra* (*P.* ×*canadensis*) – D
P. nigra var. *italica* – Ns

F. robustus Karst. D**, F**, N*, S*
Quercus petraea – Ss
Q. petraea or *Q. robur* – Ns
Q. robur – D, F, Ss

Fusarium oxysporum Schl. emend. Snyder & Hansen N**
Pinus sylvestris – Ns (damping off)

F. spp. F*, S*
Pinus sylvestris – F, S (damping off)

Ganoderma applanatum (Pers. ex Wallr.) Pat. D**, F*, N*, S*
Populus alba – Ns, S
P. balsamifera (incl. *P. candicans*) – Ns
P. deltoides – D
P. deltoides × *P. nigra* (*P.* ×*canadensis*) – D, Ns
P. nigra – Ns

P. tremula – F, Ns, S
Quercus petraea or *Q. robur* – Ns
Q. robur – D, F, S

G. lucidum (Leyss. ex Fr.) Karst. (F), (N), S*
Quercus robur – S

G. pfeifferi Bres. (*Polyporus laccatus* Kalchbr.) D*
Quercus robur – D

G. resinaceum Boud. ex Pat. D*
Quercus robur – D

Gloeosporium naevioides Romell & Sacc. N*
Populus tremula – Ns

G. tremulae (Lib.) Pass. (*Titaeosporina tremulae* (Lib.) Luyk) D*, F*, N*, S*
Populus tremula – D, F, Ns, S
P. tremula × *P. tremuloides* – D

Hendersonia acicola Tub. D*, F*, (N), S*
Pinus mugo – D
P. sylvestris – D, F, S

Herpotrichia-like mycelium F**, N**, S**
Pinus mugo var. *rostrata* – Nn
P. sylvestris – Fn, N, Sn

Hymenochaete rubiginosa (Dicks. ex Fr.) Lév. D*, F*, (N), (S)
Quercus robur – D, F

H. tabacina (Sow. ex Fr.) Lév. D*, F*, (N), (S)
Populus tremula – F
Quercus robur – D, F

Hypoderma desmazierii Duby D**
Pinus peuce – D
P. strobus – D

Hypodermella sulcigena (Rostr.) Tub. D*, F**, N**, S*
- *Pinus contorta* – S
- *P. mugo* – D, S
- *P. mugo* var. *rostrata* – Ns
- *P. mugo* var. *rotundata* – N
- *P. nigra* – Ns
- *P. sylvestris* – D, F, N, S

Lachnellula rehmii Ferd. & C. A. Jørg. D**
- *Pinus contorta* – D

Lophodermium pinastri (Schrad. ex Fr.) Chev. D***, F***, N***, S***
- *Pinus aristata* – Nn
- *P. banksiana* – D, F, Ns, S
- *P. cembra* – D, F, N, S
- *P. contorta* – D, Ns
- *P. contorta* var. *latifolia* – F, Ns
- *P. halepensis* – D
- *P. monticola* – D, F
- *P. mugo* – D, F, S
- *P. mugo* var. *rostrata* – N
- *P. mugo* var. *rotundata* – N
- *P. nigra* – D, Ns, S
- *P. nigra* var. *cebennensis* – D
- *P. ponderosa* – D
- *P. rigida* – D
- *P. strobus* – D, F, Ns
- *P. sylvestris* – D, F, N, S

Melampsora larici-populina Kleb. D*, F*, N**, S*
- *Populus balsamifera* (incl. *P. candicans*) – N
- *P. canadensis* – S
- *P. deltoides* – Ns
- *P. deltoides* × *P. nigra* (*P.* × *canadensis*) – Ns
- *P. laurifolia* – Ns, S
- *P. laurifolia* × *P. nigra* (*P.* × *berolinensis*) – Ns
- *P. nigra* – F, Ns, S
- *P. nigra* var. *italica* – Ns
- *P. trichocarpa* – D, F, Ns

M. populnea (Pers.) Karst., collective species (*M. aecidioides* (DC.) Schroet.; *M. tremulae* Tul.) D*, F*, N*, S*
Populus alba – D, Ns, S
P. alba × *P. tremula* (*P.* × *canescens*) – D
P. tremula – D, F, N, S

To the collective species *M. populnea* belong *M. larici-tremulae*, *M. magnusiana*, *M. pinitorqua*, and *M. rostrupii*:

a. *M. larici-tremulae* Kleb. D*, F*, N*, S*
Populus tremula – D, F, N, S

b. *M. magnusiana* Wagner F*, N*, S*
Populus tremula – Fs, Ns, Ss

c. *M. pinitorqua* Rostr. D***, F***, N***, S***
Pinus mugo – D
P. mugo var. *rotundata* – Ns
P. sylvestris – D, F, N, S
Populus tremula – D, F, N, S
P. tremula × *P. tremuloides* – S

d. *M. rostrupii* Wagner D*, F*, N*, S*
Populus tremula – D, Fs, N, S

Microsphaera alphitoides Griff. & Maubl. (Cleistothecia only on *Quercus robur*) D**, F**, N**, S**
Quercus frainetto – D
Q. lanuginosa (*Q. pubescens*) – D, Ns
Q. robur – D, Fs, Ns, Ss
Q. rubra – D

M. hypophylla Nevodovskij N*
Quercus robur – Ns

Mucor mucedo L. ex Fres. (D), (N), S*
Quercus robur (nuts) – S

M. racemosus Fres. (D), (N), S*
Quercus robur (nuts) – S

Mycosphaerella maculiformis (Pers. ex Fr.) Schroet. D*, (S)
  Quercus robur – D

M. punctiformis (Pers. ex Fr.) Starb. S*
  Quercus robur – S

Myxosporium lanceola Sacc. & Roum. D**
  Quercus macrocarpa – D
  Q. robur – D
  Q. rubra – D

Naemacyclus niveus (Pers. ex Fr.) Sacc. D*
  Pinus nigra – D

Nectria cinnabarina (Tode ex Fr.) Fr. D*, F*, N*, S*
  Pinus strobus – D, F
  P. sylvestris – F
  Populus deltoides – D, Ns
  P. tremula – D, F, S
  Quercus robur – D, F

N. ditissima Tul. D*, (N), (S)
  Quercus robur – D

N. fuckeliana Booth (*N. cucurbitula* auct.) D**, F*, (N), (S)
  Pinus contorta – D, F
  P. mugo – D
  P. strobus – D

N. galligena Bres. D*, N**, S*
  Populus alba – D
  P. nigra – Ns
  Quercus robur – D, Ss

Peniophora quercina (Pers. ex Fr.) Cke. (*P. corticalis* (Bull. ex Quél.) Bres.) D*, F*, (N), (S)
  Quercus robur – D, F

Pestalotia hartigii Tub. D*, F*, N*, S*
  Pinus mugo – D, F
  P. sylvestris – D, F, Ns, S

Phacidiella coniferarum Hahn (only the imperfect stage: *Phacidiopycnis pseudotsugae* (Wils.) Hahn (*Phomopsis pseudotsugae* Wils.)) F*, (N), S**
  Pinus contorta var. *latifolia* – Fs, Sn

Phacidium infestans Karst. F***, N***, S***
  Pinus cembra – Sn
  P. contorta var. *latifolia* – F, Sn
  P. mugo – Sn
  P. mugo var. *rostrata* – N
  P. mugo var. *rotundata* – Nn
  P. nigra – Sn
  P. ponderosa – Sn
  P. strobus – Sn
  P. sylvestris – F (mostly in Fn), N, Sn

Pholiota destruens (Brond.) Quél. D*, (S)
  Populus nigra – D

P. squarrosa (Pers. ex Fr.) Quél. D*, (F), N*, S*
  Populus tremula – N, S
  P. sp. – D
  Quercus robur – Sn

Phomopsis pseudotsugae Wils. cf. *Phacidiella coniferarum*

Phyllosticta populina Sacc. D*
  Populus nigra var. *italica* – D

Phytophthora cactorum (Lebert & Cohn) Schroet. (N), S*
  Pinus sylvestris – S
  Quercus robur (damping off) – S

Pleurotus ostreatus (Jacq. ex Fr.) Quél. D*, F*, (N), (S)
  Populus balsamifera (*P. candicans*) – D
  P. tremula – F
  Quercus robur – F

Pollaccia elegans Serv. cf. *Venturia populina*

P. radiosa (Lib.) Bald. cf. *Venturia tremulae*

Polyporus adustus Willd. ex Fr. D*, F*, (N), (S)
    Populus sp. – D, F

P. croceus Pers. ex Fr. D*, (N), (S)
    Quercus robur – D

P. cuticularis Bull. ex Fr. D*, (N), (S)
    Quercus robur – D

P. dryadeus Pers. ex Fr. D*
    Quercus robur – D

P. frondosus Dicks. ex Fr. D*, (F), (N), S*
    Quercus robur – D, Ss

P. pseudobetulinus Murashk. F*
    Populus tremula – F

P. quercinus Schrad. ex Fr. D*
    Quercus robur – D

P. radiatus Sow. ex Fr. D*, F*, (N), (S)
    Quercus robur – D, F

P. resinosus Fr. (*P. fuliginosus* Scop. ex Fr.) D*, (F), (N), (S)
    Pinus sylvestris – D

P. rheades Pers. (*P. vulpinus* Fr.) D*, F*, S*
    Populus tremula – D, F, S

P. schweinitzii Fr. D*, F*, N**, S*
    Pinus strobus – D, S
    P. sylvestris – D, Fs, Ns, Ss
    Quercus petraea – Ss
    Q. petraea or *Q. robur* – Ns
    Q. robur – Ss

P. spumeus Sow. ex Fr. (F), N*, (S)
    Populus deltoides × *P. nigra* (*P.* × *canadensis*) – Ns

P. squamosus Mich. ex Fr. D*, (F), N*, S*
    Quercus petraea – Ss

Q. petraea or *Q. robur* – Ns
Q. robur – D, Ss

P. sulphureus Bull. ex Fr. D***, F**, N**, S**
Populus alba – D, Ns, Ss
P. tremula – Fs, Ns, Ss
Quercus robur – D, Fs, Ns, Ss

P. suaveolens L. ex Fr. (N), S*
Populus tremula – S

P. versicolor L. ex Fr. D*, (F), (N), (S)
Quercus sp. – D

Pythium debaryanum Hesse (N), S*
Pinus sylvestris (damping off) – S

Rhizina undulata Fr. ex Fr. (*R. inflata* Schaeff.) F*, (N), S**
Pinus sylvestris – F, Sn

Rhizoctonia solani Kühn N**, S*
Pinus sylvestris – Ns, S

Rosellinia quercina Hart. D*
Quercus robur – D

Scleroderris lagerbergii Gremmen (*Crumenula abietina* Lagerb.) D**, F***, N***, S**
Pinus cembra – N, S
P. contorta var. *latifolia* – D, F, Ns, S
P. flexilis – Ns
P. griffithii – D
P. mugo – D, F
P. mugo var. *rostrata* – Ns
P. mugo var. *rotundata* – N
P. nigra – D, Ns, S
P. strobus – D, Ns
P. sylvestris – D, F, N, S

Sclerophoma magnusiana Wils. & Hahn (*S. pitya* (Sacc.) Died.) (D), F*, S*
Pinus banksiana – F

P. contorta var. *latifolia* – F
P. mugo – F
P. sylvestris – F, S (mostly as a saprophyte)

S. pithyophila (Corda) Höhn. (D), F*, N*, S*
Pinus banksiana – F
P. cembra – F
P. contorta var. *latifolia* – F, S
P. monticola – F
P. mugo – F
P. peuce – F
P. sylvestris – F, N, S (In Norway and Sweden mostly as a saprophyte; in Norway the fungus is a saprophyte on other *Pinus* species)

Sclerotinia candolleana (Lév.) Fuck. D*
Quercus robur – D

Scoleconectria cucurbitula (Tode ex Fr.) Booth (*Ophionectria cylindrospora* (Sollm.) Berl. & Vogl.) F*, (N)
Pinus sylvestris – F

Septoria populi Desm. D*
Populus laurifolia × *P. nigra* (*P.* × *berolinensis*) – D
P. tremula – D

S. quercina Desm. N*
Quercus robur – Ns

Sparassis crispa Wulf. ex Fr. D*, N*, S*
Pinus sylvestris – D, Ns, S

Stereum frustulosum Pers. ex Fr. D*, F**, N*, S*
Quercus robur – D, Fs, Ns, Ss

S. gausapatum Fr. D*, (N), (S)
Quercus sp. – D

S. hirsutum (Willd. ex Fr.) Fr. D*, F*, (N), (S)
Populus tremula – F
P. sp. – D
Quercus robur – D, F
Q. rubra – D

S. leoninum Skovsted D*
  Quercus sp. – D

S. pini (Schleich. ex Fr.) Fr. D*, F*, (N), S*
  Pinus mugo – D, S
  P. sylvestris – D, F, S

S. purpureum Pers. ex Fr. D*, F*, N*, S*
  Populus tremula – F
  P. trichocarpa – F, Ns, Ss
  P. sp. – D

S. rugosum Pers. ex Fr. D**, F**, (N), (S)
  Quercus robur – D, F

S. sanguinolentum (Alb. & Schw. ex Fr.) Schw. D*, F**, N***, S***
  Pinus sylvestris – D, F, N, S

Taphrina caerulescens (Mont. & Desm.) Tul. D*, N*, S*
  Quercus robur – D, Ns, Ss

T. johansonii Sadeb. D*, F*, N*, S*
  Populus tremula – D, F, Ns, S

T. populina Fr. (*T. aurea* auct.) D**, F*, N*, S*
  Populus angulata – Ss
  P. balsamifera – Nn
  P. deltoides – D, F, Ns
  P. deltoides × *P. nigra* (*P.* × *canadensis*) – D, Ns, Ss
  P. laurifolia × *nigra* (*P.* × *berolinensis*) – Ns
  P. nigra – D, F, Ns, Ss
  P. nigra var. *italica* – D, F, Ss
  P. tremula – D

T. rhizophora Johans. D*, S*
  Populus alba – D, Ss

Titaeosporina tremulae (Lib.) Luyk cf. *Gloeosporium tremulae* (Lib.) Pass.

Uncinula adunca (Wallr. ex Fr.) Lév. (*U. salicis* (DC.) Wt. D*, F*, N*, S*
  Populus nigra – D
  P. nigra var. *italica* – D
  P. pyramidalis – S
  P. tremula – D, F, Ns, S

Valsa nivea Fr. D*, F*, (N), S***
  Populus deltoides – D, F
  P. tremula – D, Fs
  P. tremula × *P. tremuloides* – D, Ss

V. sordida Nits. (only the imperfect stage: *Cytospora chrysosperma* Pers. ex Fr.) D**, F**, (N), S**
  Populus deltoides × *P. nigra* (*P.* × *canadensis*) – D
  P. laurifolia × *P. nigra* (*P.* × *berolinensis*) – D
  P. nigra var. *italica* – D
  P. tremula – F, S
  P. tremula × *P. tremuloides* – S

Venturia populina (Vuill.) Fabr. D***
  Populus laurifolia × *P. nigra* (*P.* × *berolinensis*) – D
  P. nigra var. *italica* – D

V. populina (Vuill.) Fabr. (only the imperfect stage: *Pollaccia elegans* Serv.) N**, S**
  Populus balsamifera (incl. *P. candicans*) – Ns
  P. koreana – Ss
  P. laurifolia × *P. nigra* (*P.* × *berolinensis*) – Ns, S
  P. nigra var. *italica* – Ns

V. tremulae Aderh. N**
  Populus tremula – N

V. tremulae Aderh. (only the imperfect stage: *Pollaccia radiosa* (Lib.) Bald.) D**, F**, N**, S*
  Populus alba – D, Ns, S
  P. alba × *P. tremula* (*P.* × *canescens*) – D
  P. tremula – D, F, S
  P. tremula × *P. tremuloides* – S

Vuilleminia comedens (Nees ex Fr.) Maire D*, F*, (N), S*
  Quercus robur – D, Fs, Ss

B. List of Hosts

- *Pinus aristata*
  - *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – N

- *Pinus banksiana*
  - *Cenangium ferruginosum* Fr. (*C. abietis* Pers. ex Duby) – F
  - *Dasyscypha calyciformis* (Willd. ex Wettst.) Rehm – S
  - *D. subtilissima* (Cke.) Sacc. – S
  - *Fomes annosus* (Fr.) Cke. – D
  - *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D, F, N, S
  - *Sclerophoma magnusiana* Wils. & Hahn (*S. pitya* (Sacc.) Died.) – F
  - *S. pithyophila* (Corda) Höhn. – F

- *Pinus cembra*
  - *Armillaria mellea* (Vahl ex Fr.) Quél. – D
  - *Cenangium ferruginosum* Fr. (*C. abietis* Pers. ex Duby) – F
  - *Dasyscypha* cf. *subtilissima* (Cke.) Sacc. – N
  - *Fomes annosus* (Fr.) Cke. – N
  - *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D, F, N, S
  - *Phacidium infestans* Karst. – S
  - *Scleroderris lagerbergii* Gremmen (*Crumenula abietina* Lagerb.) – N, S
  - *Sclerophoma pithyophila* (Corda) Höhn. – F

- *Pinus contorta*
  - *Dasyscypha calyciformis* (Willd. ex Wettst.) Rehm – D
  - *Fomes annosus* (Fr.) Cke. – D
  - *Hypodermella sulcigena* (Rostr.) Tub. – S
  - *Lachnellula rehmii* Ferd. & C. A. Jørg. – D
  - *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D, N
  - *Nectria fuckeliana* Booth (*N. cucurbitula* auct.) – D, F

Pinus contorta var. *latifolia*
- *Armillaria mellea* (Vahl ex Fr.) Quél. – D
- *Cenangium ferruginosum* Fr. (*C. abietis* Pers. ex Duby) – D, F
- *Crumenula sororia* Karst. – F
- *Dasyscypha calyciformis* (Willd. ex Wettst.) Rehm – D
- *D. subtilissima* (Cke.) Sacc. – F
- *D.* cf. *subtilissima* (Cke.) Sacc. – N
- *Discella strobilina* (Desm.) Died. (*Ascochyta parasitica* (Hart.) Rostr.) – F, N, S (in N and S on 2/0 plants)
- *Fomes annosus* (Fr.) Cke. – D, F, N, S
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – F, N
- *Phacidiella coniferarum* Hahn (only the imperfect stage: *Phacidiopycnis pseudotsugae* (Wils.) Hahn (*Phomopsis pseudotsugae* Wils.)) – F, S
- *Phacidium infestans* Karst. – F, S
- *Scleroderris lagerbergii* Gremmen (*Crumenula abietina* Lagerb.) – D, F, N, S
- *Sclerophoma magnusiana* Wils. & Hahn (*S. pitya* (Sacc.) Died.) – F
- *S. pithyophila* (Corda) Höhn. – F, S

Pinus echinata
- *Coleosporium tussilaginis* (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – D

Pinus flexilis
- *Cronartium ribicola* J. C. Fisch. – D, N
- *Scleroderris lagerbergii* Gremmen (*Crumenula abietina* Lagerb.) – N

Pinus griffithii
- *Cronartium ribicola* J. C. Fisch. – D
- *Scleroderris lagerbergii* Gremmen (*Crumenula abietina* Lagerb.) – D

Pinus halepensis
- *Armillaria mellea* (Vahl ex Fr.) Quél. – D
- *Coleosporium tussilaginis* (Pers.) Lév. (*C. pini* (Pers.) Jørst.) – D
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D

Pinus monticola
- *Cronartium ribicola* J. C. Fisch. – D, F
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D, F
- *Sclerophoma pithyophila* (Corda) Höhn. – F

Pinus mugo
- *Armillaria mellea* (Vahl ex Fr.) Quél. – D

Cenangium ferruginosum Fr. (*C. abietis* Pers. ex Duby) – D, F
Coleosporium tussilaginis (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – D
Cronartium flaccidum (Alb. & Schw.) Wint. (incl. *Peridermium pini* (Pers.) Lév.) – D
Fomes annosus (Fr.) Cke. – D
Hendersonia acicola Tub. – D
Hypodermella sulcigena (Rostr.) Tub. – D, S
Lophodermium pinastri (Schrad. ex Fr.) Chev. – D, F, S
Melampsora pinitorqua Rostr. – D
Nectria fuckeliana Booth (*N. cucurbitula* auct.) – D
Pestalotia hartigii Tub. – D, F
Phacidium infestans Karst. – S
Scleroderris lagerbergii Gremmen (*Crumenula abietina* Lagerb.) – D, F
Sclerophoma magnusiana Wils. & Hahn (*S. pitya* (Sacc.) Died.) – F
S. pithyophila (Corda) Höhn. – F
Stereum pini (Schleich. ex Fr.) Fr. – D, S

Pinus mugo var. *rostrata*
Coleosporium tussilaginis (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – N
Cronartium flaccidum (Alb. & Schw.) Wint. (incl. *Peridermium pini* (Pers.) Lév.) – N
Dasyscypha cf. *subtilissima* (Cke.) Sacc. – N
Fomes annosus (Fr.) Cke. – N
Herpotrichia-like mycelium – N
Hypodermella sulcigena (Rostr.) Tub. – N
Lophodermium pinastri (Schrad. ex Fr.) Chev. – N
Phacidium infestans Karst. – N
Scleroderris lagerbergii Gremmen (*Crumenula abietina* Lagerb.) – N

Pinus mugo var. *rotundata*
Coleosporium tussilaginis (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – N
Dasyscypha cf. *subtilissima* (Cke.) Sacc. – N
Fomes annosus (Fr.) Cke. – N
Hypodermella sulcigena (Rostr.) Tub. – N
Lophodermium pinastri (Schrad. ex Fr.) Chev. – N
Melampsora pinitorqua Rostr. – N
Phacidium infestans Karst. – N
Scleroderris lagerbergii Gremmen (*Crumenula abietina* Lagerb.) – N

Pinus nigra
- *Armillaria mellea* (Vahl ex Fr.) Quél. – D
- *Cenangium ferruginosum* Fr. (*C. abietis* Pers. ex Duby) – D
- *Coleosporium tussilaginis* (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – D, N
- *Dasyscypha* cf. *subtilissima* (Cke.) Sacc. – N
- *Fomes annosus* (Fr.) Cke. – D
- *Hypodermella sulcigena* (Rostr.) Tub. – N
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D, N, S
- *Naemacyclus niveus* (Pers. ex Fr.) Sacc. – D
- *Phacidium infestans* Karst. – S
- *Scleroderris lagerbergii* Gremmen (*Crumenula abietina* Lagerb.) – D, N, S

Pinus nigra var. *cebennensis*
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D

Pinus peuce
- *Cenangium ferruginosum* Fr. (*C. abietis* Pers. ex Duby) – F
- *Cronartium ribicola* J. C. Fisch. – F, N
- *Hypoderma desmazierii* Duby – D
- *Sclerophoma pithyophila* (Corda) Höhn. – F

Pinus ponderosa
- *Coleosporium tussilaginis* (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – N
- *Fomes annosus* (Fr.) Cke. – D
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D
- *Phacidium infestans* Karst. – S

Pinus rigida
- *Coleosporium tussilaginis* (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – D
- *Lophodermium pinastri* (Schrad. ex Fr.) Chev. – D

Pinus strobus
- *Armillaria mellea* (Vahl ex Fr.) Quél. – D
- *Cenangium ferruginosum* Fr. (*C. abietis* Pers. ex Duby) – F
- *Cronartium ribicola* J. C. Fisch. – D, F, N, S
- *Cucurbidothis pithyophila* (Fr.) Petr. (*Cucurbitaria pithyophila* (Fr.) de Not.) – D

Dasyscypha calyciformis (Willd. ex Wettst.) Rehm – D
Fomes annosus (Fr.) Cke. – D
F. pini (Thore ex Fr.) Karst. – D
Hypoderma desmazierii Duby – D
Lophodermium pinastri (Schrad. ex Fr.) Chev. – D, F, N
Nectria cinnabarina (Tode ex Fr.) Fr. – D, F
N. fuckeliana Booth (*N. cucurbitula* auct.) – D
Phacidium infestans Karst. – S
Polyporus schweinitzii Fr. – D, S
Scleroderris lagerbergii Gremmen (*Crumenula abietina* Lagerb.) – D, N

Pinus sylvestris
Armillaria mellea (Vahl ex Fr.) Quél. – D, F, N, S
Botrytis cinerea Pers. – S
Cenangium ferruginosum Fr. (*C. abietis* Pers. ex Duby) – D, F, S
Coleosporium tussilaginis (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – D, F, N, S
Cronartium flaccidum (Alb. & Schw.) Wint. (incl. *Peridermium pini* (Pers.) Lév.) – D, F, N, S
Crumenula sororia Karst. – D, F
Cucurbidothis pithyophila (Fr.) Petr. (*Cucurbitaria pithyophila* (Fr.) de Not.) – D, F, N
Cylindrocarpon radicicola Wr. – S
Dasyscypha calyciformis (Willd. ex Wettst.) Rehm – D, N, S
D. pini (Brunch.) Hahn & Ayers (*D. fuscosanguinea* auct. non Rehm) – F, N, S
D. resinaria (Cke. & Phill.) Rehm – N, S
D. subtilissima (Cke.) Sacc. – F, S
D. cf. *subtilissima* (Cke.) Sacc. – N
Discella strobilina (Desm.) Died. (*Ascochyta parasitica* (Hart.) Rostr.) – F
Fomes annosus (Fr.) Cke. – D, F, N, S
F. odoratus (Wulf. ex Fr.) Karst. (*Polyporus odoratus* Wulf. ex Fr.) – D
F. pini (Thore ex Fr.) Karst. – D, F, N, S
F. pinicola (Sw. ex Fr.) Cke. – D, F, N, S
Fusarium oxysporum Schl. emend. Snyder & Hansen – N
F. spp. – F, S
Hendersonia acicola Tub. – D, F, S
Herpotrichia-like mycelium – F, N, S
Hypodermella sulcigena (Rostr.) Tub. – D, F, N, S
Lophodermium pinastri (Schrad. ex Fr.) Chev. – D, F, N, S

Melampsora pinitorqua Rostr. – D, F, N, S
Nectria cinnabarina (Tode ex Fr.) Fr. – F
Pestalotia hartigii Tub. – D, F, N, S
Phacidium infestans Karst. – F, N, S
Phytophthora cactorum (Lebert & Cohn) Schroet. – S
Polyporus resinosus Fr. (*P. fuliginosus* Scop. ex Fr.) – D
P. schweinitzii Fr. – D, F, N, S
Pythium debaryanum Hesse – S
Rhizina undulata Fr. ex Fr. (*R. inflata* Schaeff.) – F, S
Rhizoctonia solani Kühn – N, S
Scleroderris lagerbergii Gremmen (*Crumenula abietina* Lagerb.) – D, F, N, S
Sclerophoma magnusiana Wils. & Hahn (*S. pitya* (Sacc.) Died.) – F, S
S. pithyophila (Corda) Höhn. – F, N, S
Scoleconectria cucurbitula (Tode ex Fr.) Booth (*Ophionectria cylindrospora* (Sollm.) Berl. & Vogl.) – F
Sparassis crispa Wulf. ex Fr. – D, N, S
Stereum pini (Schleich. ex Fr.) Fr. – D, F, S
S. sanguinolentum Alb. & Schw. ex Fr. – D, F, N, S

Pinus washoënsis
Coleosporium tussilaginis (Pers.) Lév. sensu lato (*C. pini* (Pers.) Jørst.) – N

Populus alba
Drepanopeziza populorum (Desm.) Höhn. sensu lato (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – D, N, S
Fomes fomentarius (L. ex Fr.) Kickx – D
F. igniarius (L. ex Fr.) Kickx – D, N, S
Ganoderma applanatum (Pers. ex Wallr.) Pat. – N, S
Melampsora populnea (Pers.) Karst. (collective species) – D, N, S
Nectria galligena Bres. – D
Polyporus sulphureus Bull. ex Fr. – D, N, S
Taphrina rhizophora Johans. – D, S
Venturia tremulae Aderh. (only the imperfect stage: *Pollaccia radiosa* (Lib.) Bald.) – D, N, S

Populus alba × P. tremula (*P. × canescens*)
Fomes annosus (Fr.) Cke. – D
F. igniarius (L. ex Fr.) Kickx – D
Melampsora populnea (Pers.) Karst. (collective species) – D

Venturia tremulae Aderh. (only the imperfect stage: *Pollaccia radiosa* (Lib.) Bald.) – D

Populus angulata
Taphrina populina Fr. (*T. aurea* auct.) – S

Populus balsamifera (incl. *P. candicans*)
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – N
Dryodon septentrionale Fr. – N
Fomes fomentarius (L. ex Fr.) Kickx – N
F. igniarius (L. ex Fr.) Kickx – N
F. populinus (Schum. ex Fr.) Cke. (*F. connatus* (Weinm.) Gill.) – N
Ganoderma applanatum (Pers. ex Wallr.) Pat. – N
Melampsora larici-populina Kleb. – N
Pleurotus ostreatus Fr. – D
Taphrina populina Fr. (*T. aurea* auct.) – N
Venturia populina (Vuill.) Fabr. (only the imperfect stage: *Pollaccia elegans* Serv.) – N

Populus deltoides
Armillaria mellea (Vahl ex Fr.) Quél. – D
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – N
Fomes fomentarius (L. ex Fr.) Kickx – D
F. populinus (Schum. ex Fr.) Cke. (*F. connatus* (Weinm.) Gill.) – D
Ganoderma applanatum (Pers. ex Wallr.) Pat. – D
Melampsora larici-populina Kleb. – N
Nectria cinnabarina (Tode ex Fr.) Fr. – D, N
Taphrina populina Fr. (*T. aurea* auct.) – D, F, N
Valsa nivea Fr. – D, F

Populus deltoides × *P. nigra* (*P.* × *canadensis*)
Armillaria mellea (Vahl ex Fr.) Quél. – D
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – N
Fomes fomentarius (L. ex Fr.) Kickx – D
F. populinus (Schum. ex Fr.) Cke. (*F. connatus* (Weinm.) Gill.) – D
Ganoderma applanatum (Pers. ex Wallr.) Pat. – D, N
Melampsora larici-populina Kleb. – N
Polyporus spumeus Sow. ex Fr. – N

Taphrina populina Fr. (*T. aurea* auct.) – D, N, S
Valsa sordida Nits. (only the imperfect stage: *Cytospora chrysosperma* Pers. ex Fr.) – D

Populus deltoides var. *angulata* × *P. nigra* var. *plantierensis* (*P.* × *robusta*)
Cryptodiaporthe populea (Sacc.) Butin (only the imperfect stage: *Chondroplea populea* (Sacc.) Kleb. (*Dothichiza populea* Sacc. & Bri.)) – D

Populus koreana
Venturia populina (Vuill.) Fabr. (only the imperfect stage: *Pollaccia elegans* Serv.) – S

Populus laurifolia
Melampsora larici-populina Kleb. – N

Populus laurifolia × *P. nigra* (*P.* × *berolinensis*)
Cryptodiaporthe populea (Sacc.) Butin – D
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – N
Melampsora larici-populina Kleb. – N
Septoria populi Desm. – D
Taphrina populina Fr. (*T. aurea* auct.) – N
Valsa sordida Nits. (only the imperfect stage: *Cytospora chrysosperma* Pers. ex Fr.) – D
Venturia populina (Vuill.) Fabr. – D, N, S (in N, S only the imperfect stage: *Pollaccia elegans* Serv.)

Populus nigra
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – N
Ganoderma applanatum (Pers. ex Wallr.) Pat. – N
Melampsora larici-populina Kleb. – F, N, S
Nectria galligena Bres. – N
Pholiota destruens (Brond.) Quél. – D
Taphrina populina Fr. (*T. aurea* auct.) – D, F, N, S
Uncinula adunca (Wallr. ex Fr.) Lév. (*U. salicis* (DC.) Wt.) – D

Populus nigra var. *italica*
Cryptodiaporthe populea (Sacc.) Butin (only the imperfect stage: *Chondroplea populea* (Sacc.) Kleb. (*Dothichiza populea* Sacc. & Bri.)) F, N, S

Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – N
Fomes populinus (Schum. ex Fr.) Cke. (*F. connatus* (Weinm.) Gill.) – N
Melampsora larici-populina Kleb. – N
Phyllosticta populina Sacc. – D
Taphrina populina Fr. (*T. aurea* auct.) – D, F, S
Uncinula adunca (Wallr. ex Fr.) Lév. (*U. salicis* (DC.) Wt.) – D
Valsa sordida Nits. (only the imperfect stage: *Cytospora chrysosperma* Pers. ex Fr.) – D
Venturia populina (Vuill.) Fabr. – D, N (in N only the imperfect stage: *Pollaccia elegans* Serv.)

Populus pyramidalis
Uncinula adunca (Wallr. ex Fr.) Lév. (*U. salicis* (DC.) Wt.) – S

Populus simonii
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – D, N

Populus tremula
Armillaria mellea (Vahl ex Fr.) Quél. – N
Drepanopeziza populorum (Desm.) Höhn. (only the imperfect stage: *Marssonina populi* (Lib.) Magn.) – F, N, S
Fomes fomentarius (L. ex Fr.) Kickx – F, N, S
F. igniarius (L. ex Fr.) Kickx var. *populinus* (Neuman) Campbell – D, F, N, S
Ganoderma applanatum (Pers. ex Wallr.) Pat. – F, N, S
Gloeosporium naevioides Romell & Sacc. – N
G. tremulae (Lib.) Pass. (*Titaeosporina tremulae* (Lib.) Luyk) – D, F, N, S
Hymenochaete tabacina (Sow. ex Fr.) Lév. – F
Melampsora larici-tremulae Kleb. – D, F, N, S
M. magnusiana Wagner – F, N, S
M. pinitorqua Rostr. – D, F, N, S
M. rostrupii Wagner – D, F, N, S
Nectria cinnabarina (Tode ex Fr.) Fr. – D, F, S
Pholiota squarrosa (Pers. ex Fr.) Quél. – N, S
Pleurotus ostreatus (Jacq. ex Fr.) Quél. – F
Polyporus pseudobetulinus Muraschk. – F
P. rheades Pers. (*P. vulpinus* Fr.) – D, F, S
P. sulphureus Bull. ex Fr. – F, N‘ S

- *P. suaveolens* L. ex Fr. – S
- *Septoria populi* Desm. – D
- *Stereum hirsutum* (Willd. ex Fr.) Fr. – F
- *S. purpureum* Pers. ex Fr. – F
- *Taphrina johansonii* Sadeb. – D, F, N, S
- *T. populina* Fr. (*T. aurea* auct.) – D
- *Uncinula adunca* (Wallr. ex Fr.) Lév. (*U. salicis* (DC.) Wt.) – D, F, N, S
- *Valsa nivea* Fr. – F
- *V. sordida* Nits. (only the imperfect stage: *Cytospora chrysosperma* Pers. ex Fr.) – F, S
- *Venturia tremulae* Aderh. – D, F, N, S (in D, F, S only the imperfect stage: *Pollaccia radiosa* (Lib.) Bald.)

Populus tremula × *P. tremuloides*
- *Cryptodiaporthe populea* (Sacc.) Butin – D
- *Gloeosporium tremulae* (Lib.) Pass. (*Titaeosporina tremulae* (Lib.) Luyk) – D
- *Melampsora pinitorqua* Rostr. – S
- *Valsa nivea* Fr. – D, S
- *V. sordida* Nits. (only the imperfect stage: *Cytospora chrysosperma* Pers. ex Fr.) – S
- *Venturia tremulae* Aderh. (only the imperfect stage: *Pollaccia radiosa* (Lib.) Bald.) – S

Populus trichocarpa
- *Armillaria mellea* (Vahl ex Fr.) Quél. – D
- *Melampsora larici-populina* Kleb. – D, F, N
- *Stereum purpureum* Pers. ex Fr. – F, N, S

Populus sp.
- *Daedalea confragosa* Bolt. ex Fr. (*Trametes confragosa* (Bolt. ex Fr.) Jørst.) – D
- *Fomes conchatus* (Pers. ex Fr.) Gill. – N
- *Pholiota squarrosa* (Pers. ex Fr.) Quél. – D
- *Polyporus adustus* Willd. ex Fr. – D, F
- *Stereum hirsutum* (Willd. ex Fr.) Fr. – D
- *S. purpureum* Pers. ex Fr. – D

Quercus frainetto
- *Microsphaera alphitoides* Griff. & Maubl. (only *Oidium*) – D

Quercus lanuginosa (*Q. pubescens*)
- *Microsphaera alphitoides* Griff. & Maubl. (only *Oidium*) – D, N

Quercus macrocarpa
    Myxosporium lanceola Sacc. & Roum. – D

Quercus palustris
    Daldinia concentrica (Fr.) Ces. & de Not. (*D. tuberosa* (Scop.) Schroet.) – D

Quercus petraea
    Apiognomonia quercina (Kleb.) Höhn. – D
    Ciboria batschiana (Zopf) Buchw. (*Sclerotinia pseudotuberosa* (Rehm) Rehm) – D
    Daedalea quercina L. ex Fr. – N, S
    Fistulina hepatica Schaeff. ex Fr. – S
    Fomes annosus (Fr.) Cke. – S
    F. robustus Karst. – S
    Polyporus schweinitzii Fr. – S
    P. squamosus Mich. ex Fr. – S

Quercus petraea or *Q. robur*
    Fistulina hepatica Schaeff. ex Fr. – N
    Fomes annosus (Fr.) Cke. – N
    F. robustus Karst. – N
    Ganoderma applanatum (Pers. ex Wallr.) Pat. – N
    Polyporus schweinitzii Fr. – N
    P. squamosus Mich. ex Fr. – N

Quercus robur
    Apiognomonia quercina (Kleb.) Höhn. (only the imperfect stage: *Gloeosporium quercinum* West.) – D, F, N, S
    Armillaria mellea (Vahl ex Fr.) Quél. – D
    Ciboria batschiana (Zopf) Buchw. (*Sclerotinia pseudotuberosa* (Rehm) Rehm) – D
    C. sydowiana Rehm – D
    Colpoma quercina (Pers. ex Fr.) Wallr. (*Clithris quercina* (Pers. ex Fr.) Rehm) – D, F, S
    Daedalea quercina L. ex Fr. – D, F, N, S
    Diaporthe taleola (Fr.) Sacc. – D, S
    Fistulina hepatica Schaeff. ex Fr. – D, F, S
    Fomes annosus (Fr.) Cke. – D, S
    F. cytisinus (Berk.) Gill. (non *Polyporus fraxineus* Bull. ex Fr. = *Fomes ulmarius* Cke.) – D
    F. fomentarius (L. ex Fr.) Kickx – D, F
    F. robustus Karst. – D, F, S

Ganoderma applanatum (Pers. ex Wallr.) Pat. – D, F, S
G. lucidum (Leyss. ex Fr.) Karst. – S
G. pfeifferi Bres. (*Polyporus laccatus* Kalchbr.) – D
G. resinaceum Boud. ex Pat. – D
Hymenochaete rubiginosa (Dicks. ex Fr.) Lév. – D, F
H. tabacina (Sow. ex Fr.) Lév. – D, F
Microsphaera alphitoides Griff. & Maubl. – D, F, N, S
M. hypophylla Nevodovskij – N
Mucor mucedo L. ex Fres. – S
M. racemosus Fres. – S
Mycosphaerella maculiformis (Pers. ex Fr.) Schroet. – D
M. punctiformis (Pers. ex Fr.) Starb. – S
Myxosporium lanceola Sacc. & Roum. – D
Nectria cinnabarina (Tode ex Fr.) Fr. – D, F
N. ditissima Tul. – D
N. galligena Bres. – D, S
Peniophora quercina (Pers. ex Fr.) Cke. (*P. corticalis* (Bull. ex Quél.) Bres.) – D, F
Pholiota squarrosa (Pers. ex Fr.) Quél. – S
Phytophthora cactorum (Lebert & Cohn.) Schroet. – S
Pleurotus ostreatus (Jacq. ex Fr.) Quél. – F
Polyporus croceus Pers. ex Fr. – D
P. cuticularis Bull. ex Fr. – D
P. dryadeus Pers. ex Fr. – D
P. frondosus Dicks. ex Fr. – D, S
P. quercinus Schrad. ex Fr. – D
P. radiatus Sow. ex Fr – D, F
P. schweinitzii Fr. – S
P. squamosus Mich. ex Fr. – D, S
P. sulphureus Bull. ex Fr. – D, F, N, S
Rosellinia quercina Hart. – D
Sclerotinia candolleana (Lév.) Fuck. – D
Septoria quercina Desm. – N
Stereum frustulosum Pers. ex Fr. – D, F, N, S
S. hirsutum (Willd. ex Fr.) Fr. – D, F
S. rugosum Pers. ex Fr. – D, F
Taphrina caerulescens (Mont. & Desm.) Tul. – D, N, S
Vuilleminia comedens (Nees ex Fr.) Marie – D, F, S

Quercus rubra (*Q. borealis*)
Armillaria mellea (Vahl ex Fr.) Quél. – D

Fomes annosus (Fr.) Cke. – D, S
Microsphaera alphitoides Griff. & Maubl. (only *Oidium*) – D
Myxosporium lanceola Sacc. & Roum. – D
Stereum hirsutum (Willd. ex Fr.) Fr. – D

Quercus sp.
Hymenochaete rubiginosa (Dicks. ex Fr.) Lév. – D
H. tabacina (Sow. ex Fr.) Lév. – D
Polyporus versicolor L. ex Fr. – D
Stereum gausapatum Fr. – D
S. leoninum Skovsted – D

NORWEGIAN FOREST RESEARCH INSTITUTE, VOLLEBEKK, NORWAY

DET NORSKE SKOGFORSØKSVESEN, VOLLEBEKK, NORGE

F. ROLL-HANSEN

Microsphaera hypophylla Nevodovskij (*M. silvatica* Vlasov), an Oak Powdery Mildew Fungus

Microsphaera hypophylla Nevodovskij (*M. silvatica* Vlasov), en eikemjøldoggsopp

VOLLEBEKK 1961

Contents

Page
Summary 41
Occurence in Norway, nomenclature and diagnosis 41
Relation to other *Microsphaera* spp., especially those on *Quercus* 42
- 1. European species 42
  - «*Calocladia penicillata* f. *Quercus*» 42
  - *Microsphaera abbreviata* Peck 45
  - *M. extensa* var. *pseudoamericana* Klika 45
  - *M. penicillata* (Wallr. ex Fr.) Lév. (*M. alni* (Wallr. ex Tul.) Wint.) 45
  - *M. penicillata* f. *quercina* Jačevskij 46
  - *M. alphitoides* Griff. et Maubl. 46
  - *Oidium quercinum* v. Thümen 49
- 2. American species 49
  - *Microsphaera abbreviata* Peck 49
  - *M. calocladophora* Atkins 49
  - *M. densissima* (Schw.) Cooke & Peck 50
  - *M. extensa* Cooke & Peck 50
- 3. Eastern Asiatic species 50
  - *Microsphaera* «*alni*» 50
  - *M. alni* var. *dentata* (Liou) Tai 50
  - *M. querci* Sawada 50

Distribution of *Microsphaera silvatica* 51
Microsphaera hypophylla Nevodovskij 51
Emended Latin diagnosis of *Microsphaera hypophylla* Nevodovskij 53
Acknowledgements 53
Literature 54
Microsphaera hypophylla Nevodovskij (*M. silvatica* Vlasov), en eikemjøldoggsopp 54
Illustrations 55

Microsphaera hypophylla Nevodovskij (*M. silvatica* Vlasov), an Oak Powdery Mildew Fungus*

Summary

A *Microsphaera* with plenty of cleistothecia was collected on leaves of *Quercus robur* in Norway: Akershus: Ås. The fungus is found to be identical with *M. silvatica* nom. nud., widely distributed in SSSR, and described without diagnosis in Latin by VLASOV (1954). A diagnosis by Vlasov in Russian is translated into English. A discussion of the relation to other *Microsphaera* spp. is given. The distribution is outlined. Finally *M. silvatica* is found to be a synonym of *M. hypophylla* Nevodovskij, the latter, which was published in 1952 with a short diagnosis in Latin, being the valid name. An emended diagnosis in Latin is given.

Occurence in Norway, nomenclature and diagnosis

On October 18, 1955, the author found a *Microsphaera* with numerous cleistothecia on leaves of *Quercus robur* L. 30 km south of Oslo, in Ås. The fungus has since been found each year at the same spot, but nowhere else in Norway. It was identified as *M. silvatica* nom. nud., described by VLASOV (1954) from *Quercus robur* in European SSSR. He gave a diagnosis in Russian, but not in Latin. *Microsphaera silvatica* is therefore a nomen nudum (cfr. LANJOUW et al. 1956, article 34).

Vlasov's diagnosis translated into English:

"Mycelium-cover white, weakly developed and smooth, seldom more conspicuous with farinaceous-granular surface, mostly on the lower surface of the leaves.

---

* Manuscript received September 20, 1960

Mycelium cobwebby, diameter of the hyphae 4–5μ. Conidiophores 5–6μ near the base and 7 8μ near the top; length 42–100μ, mean values 68–88μ. Conidia cylindrical, with obtusely rounded ends, 9–21 × 27–66μ, mean values 14–16 × 38–43μ; ratio of the length of the conidia to their width 1.7–4.5, seldom up to 5.0, mean values 2.7–2.9.

Cleistothecia numerous, spread on the lower surface of infected leaves, diameter 87–154μ, mean values 111–119μ.

Appendages on the cleistothecia 5–19, averages 11–15; at the apex divided 4–7 times, with averages 5–6 times; main branches elongated, ultimate branches thin, usually hook-shapedly recurved, or straight. Total length of the appendages 75–212μ, mean values 123–165μ. Diameter of the unbranched part of the appendages 8–9μ below and 6–7μ above, length 46–170μ, mean values 82–114μ. Length of the branched part 25–75μ, with mean values 40–51μ, width of this part 45–90μ, with average 72μ; ratio of length of unbranched part to branched part 2–2.5; ratio of width of branched part to its length in average 1.7.

Asci 6–9, size 25–56 × 40–73μ, mean values 37–39 × 58–62μ. Ascospores usually 8, size 6–15 × 13–29μ, mean values 10–12 × 21–24μ."

Relation to other *Microsphaera* spp., especially those on *Quercus*

1. European species

«*Calocladia penicillata* f. *Quercus*»

This fungus is described by Passerini (1881). It was found in Italy 1875. Vlasov (1954, table 16) compares it with his own fungus. He finds no significant difference, and, on p. 176, discussing *M. silvatica*, he says about this latter species: "In the light of the considerations stated above it is possible to regard the year 1875 as the date of discovery, that is when Passerini's collection was found." (Translated from Russian.)

But Vlasov apparently has not seen the paper by Blumer (1933) and has not studied the herbarium material of the fungus.

Blumer (1933:323–4) writes: "Auf der untersuchten Probe fand ich ein gut ausgebildetes Mycel hauptsächlich auf der Oberseite der Blätter. Die Fruchtkörper sind auf beiden Seiten zerstreut···. Anhängsel ··· ungefähr so lang wie der Durchmesser des Fruchtkörpers, am ende 3–5 mal dichotom verzweigt, ···. Asci ··· 5–6 sporig."

I have myself examined "*Calocladia penicillata* f. *Quercus* Passerini" (Rabenhorst, Fungi europaei, 2032) and compared the results with the Norwegian material of *Microsphaera silvatica* (table 1) and with Vlasov's own description.

The ratio of the mean length to the mean width of the conidia is lower for "*Calocladia penicillata* f. *Quercus*" than it is for *M. silvatica* (figs. 1 a - b and 3 a - b).

Table 1. Juxtaposed characteristics of "*Calocladia penicillata* f. *Quercus*", *Microsphaera alphitoides*, and *M. silvatica*

Characters		"*Calocladia penicillata* f. *Quercus*" Rab. Fung. eur. 2032	*Microsphaera alphitoides* Norwegian material	*Microsphaera silvatica* Norwegian material
		Conidial stage		
Development of the mycelium-cover		Weak	Good	Weak
Character of the mycelium-cover		Cobwebby	Compact weave	Cobwebby
Formation of conidia		Weak	Abundant	Weak
Form of conidia		Cylindrical with obtusely rounded ends	Ellipsoidal	Cylindrical with obtusely rounded ends
Length of conidia	Variation (μ)	25–39 (n=25)	20–38 (n=200)	21–46 (n=500)
	Mean value (μ)	31.8 «	26.9 «	34.7 «
Width of conidia	Variation (μ)	11–15 «	12–26 «	9–17 «
	Mean value (μ)	13.6 «	15.6 «	11.9 «
Ratio of the length of the conidia to their width	Variation	2.1–3.2 «	1.0–2.6 «	1.8–4.8 «
	Mean value	2.4 «	1.7 «	2.9 «
		Cleistothecia		
Adherence to the mycelium		Weak	Good	Weak
Form of the upper part		Convex, flattened, or with cupshaped depression	Convex	Convex, flattened, or with cupshaped depression
Diameter	Variation (μ)	104–139 (n=10)	(Very scarce material)	76–115 (n=200)
	Mean value (μ)	118 «		97 «

Table 1 continued

Characters		"*Calocladia penicillata* f. *Quercus*" Rab. Fung. eur. 2032	*Microsphaera alphitoides* Norwegian material	*Microsphaera silvatica* Norwegian material
Appendages of the cleistothecia				
General appearance		Not forming a pronounced white crown	Not forming a pronounced white crown	Forming a pronounced white crown
Times divided		0–5	(Very scarce material)	0–8
Total length of appendages divided 3 or more times	Variation (μ)	60–143 (n=106)		88–264 (n=200)
	Mean value (μ)	101 «		165 «
Total length of appendages divided 3 times	Variation (μ)	60–143 (n=45)		99–159 (n=3)
	Mean value (μ)	97 «		127 «
Total length of appendages divided 4 times	Variation (μ)	75–143 (n=53)		96–205 (n=32)
	Mean value (μ)	105 «		150 «
Total length of appendages divided 5 times	Variation (μ)	73–120 (n=8)		88–218 (n=48)
	Mean value (μ)	99 «		152 «
Ratio of the mean of the length of the appendages divided 3 or more times to the mean of the diameters of the cleistothecia		<1		>1.5
Ascospores				
Number per ascus		3–6, mostly 5		8
Length	Variation (μ)	17–29 (n=50)		18–27 (n=200)
	Mean value (μ)	20.5 «		22.7 «
Width	Variation (μ)	10–14 «		10–13 «
	Mean value (μ)	11.3 «		10.9 «

The appendages of the former fungus do not form a so pronounced white crown as those of the latter fungus.

I found that the appendages of the former fungus are divided 0–5 times and those of the latter one 0–8 times.

The mean value of the length of the appendages is significantly less in Passerini's fungus than what is found in ours. This is true if we for each species group together all the appendages divided 3 or more times, or if we only juxtapose appendages divided 3, 4, or 5 times.

The ratio of the mean of the length of the appendages divided 3 or more times to the mean of the diameters of the cleistothecia was found to be less than 1 in the Italian fungus, but greater than 1.5 in the Norwegian fungus.

The appearance of the appendages is different in the two species (figs. 4 a - c and 6 a - b; GRIFFON & MAUBLANC 1912, pl. V, figs. 19–20).

Further it seems important that Passerini's fungus has 3–6 (mostly 5) spores per ascus, whereas our fungus normally has 8.

In my opinion the conclusion must be that "*Calocladia penicillata* f. *Quercus* Passerini" and *Microsphaera silvatica* are clearly different.

(It seems to be clear from table 1 and figs. 1 a - b, 2, 4 a - c, and 5 that also "*Calocladia penicillata* f. *Quercus*" and *Microsphaera alphitoides* are clearly different.)

Microsphaera abbreviata Peck

SĂVULESCU & SANDU-VILLE (1929) record this fungus found in Rumania. But they give *M. alphitoides* as a synonym (loc. cit. p. 35). Their "*M. abbreviata*" is probably the same as *M. alphitoides*. This may also be the case in Hungary, where *M. abbreviata* is mentioned by UBRIZSY (1946).

M. extensa var. *pseudoamericana* Klika

This variety was found on the American *Quercus laurifolia*, grown in Czechoslovakia. It is described by KLIKA (1924:27). It has fewer, longer, and more flaccid appendages than *M. silvatica*.

M. penicillata (Wallr. ex Fr.) Lév. (*M. alni* (Wallr. ex Tul.) Wint.)

The valid specific epithet is *penicillata* and Wallroth's specimen on *Alnus* is the type (FRIES 1829:243 4). The *Microsphaera* on *Alnus* must be regarded as *M. penicillata* sensu stricto. The host species of the type is *A. glutinosa* (WALLROTH 1833:755), not *A. fruticosa* as mentioned by FRIES (loc. cit. p. 244). As shown by SALMON (1900:134–5), A.P. de Candolle can not be considered author of the specific epithet *alni*; Wallroth's name dates from 1819; it is used by L.R. and C. Tulasne 1861.

In the year 1899 "*Microsphaera Alni* (Wallr.)" was found by E. MAYOR (1909:50) on *Quercus robur* in Switzerland, Geneva. The cleistothecia were unripe; it has been thought to be *M.* "*alni*" or *M. viburni* (Duby) Blumer (BLUMER 1933:325).

M. penicillata sensu stricto has smaller and relatively broader conidia than *M. silvatica* (table 15 of Vlasov), and the cleistothecia are smaller than those of *M. silvatica* (table 16 of Vlasov). But Vlasov, comparing the conidial stage of *M. silvatica* with that of Mayor's fungus (loc. cit. table 15 and p. 173), finds it probable that this last fungus is *M. silvatica.*

In my opinion Mayor's fungus seems to be different from *M. silvatica.* The first fungus has the mycelium on the upper side of the leaves; the mean value of the ratios of length to width of the conidia is 2.1 (Vlasov 1954, table 15). The latter fungus has the mycelium mostly on the lower side of the leaves; the mean value of the ratios of length to width of the conidia is 2.7–2.9.

But Mayor's fungus may be identical with "*Calocladia penicillata* f. *Quercus*".

M. penicillata f. *quercina* Jačevskij

A. A. Jačevskij (1927:355) described this as a form, including not only *Oidium quercinum* v. Thümen, but apparently also *Calocladia penicillata* f. *quercus* Passerini, as well as the *Microsphaera* collected by Mayor on oak in 1899. Vlasov (1954:173 5) in his *M. silvatica* incorporates *M. penicillata* f. *quercina* including the Portuguese, the Italian, and the Swiss fungus. But, as mentioned above, Passerini's fungus is in my opinion quite distinct from *M. silvatica.*

Golovin (1956:355) gives the following synonyms of *M. penicillata* f. *quercina*: *Calocladia penicillata* Lév. f. *quercus* Passerini, *Oidium quercinum* v. Thümen, *Microsphaera hypophylla* Nevodovskij, and *M. silvatica* Vlasov. According to Golovin the mycelium is mostly formed on the upper side of the leaves, and the appendages are divided 4 times. But this is not at all characteristic of *M. hypophylla* (vide below, p. 53) and not in accordance with the descriptions given by Nevodovskij (1952) and Vlasov (1954). The reason must be that Golovin's description is based on more than one species.

M. alphitoides Griff. et Maubl.

This species is by Vlasov (1954) very carefully compared with *M. silvatica* and found quite distinct. He gives the main data in his table 14, which I translate (table 2).

Figs. 2 and 3 a - b show the different shape of the conidia of the two species; figs. 5 and 6 a - b show the different branching.

As to biology the following may be added to table 2:

Vlasov found that the spring leaves are often attacked by *M. silvatica,* but very seldom by *M. alphitoides.*

M. silvatica forms cleistothecia abundantly; Vlasov (1954:160) found them only on the lower side of the leaves, but under Norwegian conditions a few may also be found on the upper side. Contrary to this, especially in the more Atlantic climate in Western Europe, *M. alphitoides* forms few or no cleistothecia, and these are usually formed on the upper side of the leaves.

Blumer (1948:63-4), discussing *M. alphitoides*, writes: "Im Oktober 1947 fanden E. Bosch, A. Harder und ich reichlich Fruchtkörper auf Eichen in Wädenswil, Schindellegi, Samstagern, Richterswil sowie an verschiedenen Standorten am Hallwilersee. Im Gegensatz zu meinen frühern Beobachtungen aus dem Kanton Bern fanden wir 1947 die

Table 2. Juxtaposed characteristics of *Microsphaera alphitoides* and *M. silvatica* (Vlasov 1954)

Characters		*M. alphitoides*	*M. silvatica*
		Conidial stage	
Development of the mycelium-cover		Good	Weak, more seldom moderate
Surface of the mycelium-cover		Farinaceous, later felty	Smooth, more seldom granular
Character of the mycelium		Compact weave	Cobwebby
Formation of conidia		Abundant	Weak or moderate
Form of conidia		Ellipsoidal, more seldom oval or roundish	Cylindrical with obtusely rounded ends
Length of conidia	Variation (μ)	20–50	27–66
	Mean values (μ)	30–38	38–48
Width of conidia	Variation (μ)	13–28	9–21
	Mean values (μ)	20–22	14–16
Ratio of the length of the conidia to their width	Variation	1.0–2.6	1.7–5.0
	Mean values	1.4–1.8	2.7–2.9
		Cleistothecia	
Distribution on the leaves		Accumulated	Scattered
Adherence to the mycelium		Good	Weak
Maturity		Not simultaneous	Simultaneous
Form of the upper part		Convex	Convex, flattened, or with cupshaped depression
Diameter	Variation (μ)	83–176	87–154
	Mean values (μ)	120–128	111–119

Table 2 continued

Characters		*M. alphitoides*	*M. silvatica*
Appendages of the cleistothecia			
General appearance		Ascend straigth up; white "crown" of branched apexes is absent	Ascending, bend to the centre, the branched apexes form a white "crown"
Total length	Variation (μ)	69–171	75–212
	Mean values (μ)	99–121	123–165
Length of the appendages compared with the diameter of the cleistothecia		Mostly shorter	Mostly longer
Length of the unbranched part	Variation (μ)	41–128	46–170
	Mean values (μ)	78– 95	84–114
Length of the branched part	Variation (μ)	15–39	25–75
	Mean values (μ)	21–26	40–48
Average ratio of the unbranched part to the branched part		3–4	2–2.5
Width of the branched part	Variation (μ)	21–48	45–90
	Mean value (μ)	35	72
Character of the branched part of the appendages		Coralformed; branches relatively thick and short	Finely branched; branches relatively thin, elongated
Times divided		3–5; average 4	4–7; average 5–6
Ultimate branches		Varying; straight, recurved, and other forms	Hook-shapedly recurved, now and then straight
Biological features			
Conditions of good development		In conditions of good illumination; on the leaves in the upper crownstoreys; on the upper side of the leaves	In conditions of shading; on the leaves in the lower crownstoreys; on the lower side of the leaves
Overwintering		By cleistothecia or mycelium in the buds	By cleistothecia
Harmfullness		Strong	Weak
Infected organs of the oak		Leaves and green shoots	Leaves

Perithecien meist auf der Blattunterseite, und zwar oft an normalen Blättern, die nur sehr schwach vom Oidium befallen waren. Eine eingehende Untersuchung müsste erst zeigen, ob es sich überhaupt um den gleichen Pilz handelt." This fungus may very well have been *M. silvatica.*

Oidum quercinum v. Thümen

In the year 1877 an *Oidium*, described by v. Thümen in 1878 as *Oidium quercinum*, was found in Portugal on *Quercus robur* L. (named *Q. racemosa* Lam.). BLUMER (1933:325) thinks that this fungus may be identical with *M. alphitoides*, but he does not rule out the possibility that it is the same as "*Calocladia penicillata* f. *Quercus*".

Vlasov, comparing characters of the conidial stage (1954:173 and table 15), finds it probable that the fungus is *M. silvatica*.

In my own opinion *Oidium quercinum* is different from *M. silvatica*. The first fungus has the mycelium mostly on the upper side of the leaves; mean ratio of length to width of the conidia is 2.0; no cleistothecia were found (SACCARDO 1886:44; VLASOV 1954, table 15). The second fungus has the mycelium almost exclusively on the lower side of the leaves; mean ratio of length to width of the conidia is 2.7–2.9; there is plenty of cleistothecia (VLASOV 1954, tables 14, 15, and 16).

But I find it likely that *Oidium quercinum* is identical with "*Calocladia penicillata* f. *Quercus*".

2. American species

SALMON (1900:129–156) put all the earlier described American *Microsphaera* spp. from *Quercus* in one species, *M. alni*, inclusive *M. alni* var. *calocladophora* (Atkins) Salmon and *M. alni* var. *extensa* (Cooke & Peck) Salmon.

GRIFFON & MAUBLANC (1912:88 97) and BLUMER (1933:325–332) discuss the American species on *Quercus*: *M. abbreviata* Peck, *M. calocladophora* Atkins, *M. densissima* (Schw.) Cooke & Peck, and *M. extensa* Cooke & Peck.

Comparison of the descriptions given by Salmon, by Griffon & Maublanc, and by Blumer of the above species with characters of *M. silvatica* gives the following results:

Microsphaera abbreviata Peck

This species inter alia has much shorter appendages than *M. silvatica*.

M. calocladophora Atkins

SALMON (1900:154) gives the following description: "Main axis of many of the appendages not dividing dichotomously at the apex, but growing on and bearing sets of opposite branches, which occasionally show the same axial elongation;" In this character it clearly differs from *M. silvatica*. We may regard *M. calocladophora* as a variety of *M. abbreviata* (SALMON 1900:153–4. GRIFFON & MAUBLANC 1912:96–7).

M. densissima (Schw.) Cooke & Peck

The forming of mycelium mostly on the upper surface of the leaves as definite patches has been considered characteristic of this fungus, whereas *M. silvatica* mostly forms the mycelium on the lower surface of the leaves and not at all in definite patches. But *M. densissima* is perhaps no distinct species either (Salmon 1900:136–7) and may be included under *M. abbreviata* (Griffon & Maublanc 1912:91).

M. extensa Cooke & Peck

This species has much longer and more flexuose and flaccid appendages than *M. silvatica.*

The comparison shows that none of the American species mentioned is identical with *M. silvatica.*

3. Eastern Asiatic species

Microsphaera «alni»

M. alni has several times been reported as found on *Quercus* spp. in China. Tai (1946:114) writes that he "has made a careful study of all the available collections of the Chinese forms of *Microsphaera*" ··· "that occur on the genus *Quercus*, and found that they are not identical with any of the species so far described on this genus. The appendages of the Chinese forms are usually shorter than or equal to the diameter of the perithecium (sometimes only one-half as long), ···" Tai concludes: "The writer is thus inclined to the opinion that the Chinese forms of *Microsphaera* on *Quercus* so far studied had better be referred to *M. Alni* as emended by Salmon."

It is clear that at least the greater part of the Chinese material is different from *M. silvatica*. But it is not possible to be quite sure that this last species might not be included in "*M. alni*".

M. alni var. *dentatae* (Liou) Tai

Tai (1946:115) writes that the mode of branching of this variety "is somewhat similar to that of *M. alni calocladophora* (Atk.) Salm. in that the main axis of the primary branches, not dividing dichotomously at the apex, often grows on and bears sets of opposite branches, ···" This variety seems to be clearly different from *M. silvatica.*

M. querci Sawada

The latin diagnosis seems to exclude *M. silvatica*. Sawada (1951:122) writes i. a.: "Mycelium foliis epigenum tenuiter in totis superficiebus evanescens sub foliis. Perithecia superis superficiebus multa, inferis rara, ··· cum 6–11 appendicibus ···"

Distribution of *Microsphaera silvatica*

Vlasov (loc. cit. p. 167) shows that *M. silvatica* is a parasite on *Quercus robur* in the region Moscow – Tula – Voronej – Penza – Stalingrad – Stalino – Dnepropetrovsk.

The same author (1957:28) states that V. K. Matveevoj has found the fungus in Kazakhstan.

Later it is collected in Norway.

It may have been found in Switzerland (vide p. 47-48).

Our fungus is consequently widely spread and will undoubtedly be found in other regions in SSSR and probably in different countries in Western Europe.

Microsphaera hypophylla Nevodovskij

Having already finished the comparision between *Microsphaera silvatica* Vlasov and other *Microsphaera* spp. on *Quercus*, I later learned from the Review of Applied Mycology *39*:55, that Gorlenko (1959) had maintained the identity between Vlasov's fungus and *M. hypophylla* described by Nevodovskij (1952). As Nevodovskij gave a Latin diagnosis, and as his name is the older one, the valid name of the fungus is *Microsphaera hypophylla* Nevodovskij.

Gorlenko (1959) compares Nevodovskij's description with that made by Vlasov and concludes that it is a question of one and the same species. His conclusion seems convincing, though there are certain discrepancies between the two descriptions. It may be mentioned, for example, that according to Nevodovskij there are only 6–7 ascospores per ascus, whereas Vlasov (and I too) found 8.

The Commonwealth Mycological Institute had the kindness to let me examine Griby SSSR *1*, 4 (Herb. I. M. I. No. 62987), "Ex Type Coll.". It contains a collection of *Microsphaera hypophylla* on leaves of *Quercus robur*, collected by Nevodovskij in the region of Moscow on October 3, 1950. The herbarium label of the exsiccatum gives drawings of the fungus, a diagnosis in Russian, a very short one in Latin, and remarks as to the relation to some other *Microsphaera* spp. on *Quercus*. The distribution before Jan. 1, 1953, of this exsiccatum, accompanied by an original diagnosis in Russian and in Latin, constitutes effective publication (cfr. Lanjouw et al. 1956, article 31).

Nevodovskij's diagnosis, translated from Russian:

"Develops on the lower surface of the leaves. Mycelium weakly developed, hardly visible, disappearing. Conidia single, formed during a short period simultaneously with the cleistocarpia and few in number, of variable form and unequal size – from 10×16μ to 31×54μ.

Cleistocarpia evenly and abundantly dispersed on large parts of, or often on all, the leaf, 75–120μ in diameter.

Appendages 9–20, when fully developed divided 5–6 times at the apex, ultimate branches beakshapedly recurved; length of appendages (branches included) 100–160μ, diameter at the base 6–8μ.

Cells of the peridium irregularly roundish-angular, width 10–12μ.

Asci 5–7 in the cleistocarpium, obovate, almost sitting, 60–70×40μ.

Spores elliptical, 6–7 per ascus, 19–25×9–11μ."

Nevodovskij's Latin diagnosis:

"*MICROSPHAERA HYPOPHYLLA* Nevodovsky Sp. n. interdum. A *Microsphaera alphitoides* differt dispositione hypophylla et perparva evolutione status Oidii. In folis *Quercus robur* L. USSR, Mosqua, 3. X. 1950 [G. Nevodovsky]."

Nevodovskij also mentions that on young cleistothecia collected 1951 the appendages were often without branches, or divided 4–5 times at the apex with irregularly rounded ultimate branches. Spores collected July 7, 1951, were found to be 9–10×20–24μ, and those collected October 9, 1951, 12–14×22–28μ.

There are some discrepancies between, on the one hand, the description given by Nevodovskij and, on the other what Vlasov and I have found:

Nevodovskij's description and drawings of the conidia do not give a clear picture of their form. On the herbarium label Nevodovskij says that conidia are lacking in the collection of October 3, 1950. I was, however, lucky enough to find one conidium, and this conidium had the long cylindrical form with rounded ends so characteristic of *M. silvatica* and quite different from what is ever found in *M. alphitoides* (figs. 2 and 3 a-b).

Nevodovskij writes that the appendages, when fully developed, are divided 5–6 times. In the material of October 3, 1950, I found some appendages divided 7 times. The mode of branching was exactly the same as in *M. silvatica*.

The main discrepancy between the description given by Nevodovskij on the one hand and what Vlasov and I have found on the other, seems to be that Nevodovskij says that there are 6–7 spores per ascus, whereas Vlasov and I found normally 8. But Nevodovskij himself has drawn two asci with 8 spores in each and one with 6 spores. Examining the material collected by Nevodovskij on October 3, 1950 ("Ex Type Coll."), I found 8 spores per ascus.

The conclusion must be that the fungus of Vlasov and that of Nevodovskij are one and the same species. The valid name is *Microsphaera hypophylla* Nevodovskij.

Emended Latin diagnosis of *Microsphaera hypophylla* Nevodovskij (The diagnosis of *M. silvitica* Vlasov emended and translated)

Mycelium albidum, tenue, arachnoideum, interdum paullo farinosius, plerumque hypophyllum. Hyphae diametros 4–5μ.

Conidiophora infra 5-6μ, in superiore parte 7–8μ crassa; longitudo invenitur ab 42 ad 100μ, inter singulas collectiones medium* longitudinis ab 66 ad 88μ variat.

Conidia cylindrica, utrinque rotundata, 9–21×21–66μ, media 12–16×35–43μ; ratio inter longitudinem et latitudinem 1,7–5,0, media 2,7—2,9.

Cleistothecia numerosissima, sparsa, hypophylla, quorum diametros 75–154μ, media 97–119μ.

Appendices 5–26, fere 11–19; bifurcatae ad octies, plerumque quinquies-septies; rami extremi tenues, plerumque revoluti uncinatique; longitudo appendicum 75–265μ, media 123–165μ.

Asci singuli cleistothecii 6-9; 25–56×40–73μ, media 36–39×58-62μ; 8 sporas ferentes. Ascosporae 6–15×13–29, media 10–12×21–24μ.

Acknowledgements

My thanks are due to professor dr. philos. Leiv Amundsen who has corrected the Latin diagnosis and to dr. philos. Diderik Roll-Hansen who has corrected the English text. Dr. philos. Ivar Jørstad has kindly read the manuscript.

---

* Medium = $\bar{x} = \frac{1}{n}\Sigma x_i$

Literature

Blumer, S. 1933. Die Erysiphaceen Mitteleuropas mit besonderer Berücksichtigung der Schweiz. Zürich. 483 p.

— 1948. Beiträge zur Kenntnis der Erysiphaceen. Ber. schweiz. bot. Ges. *58*:63–4.

Fries, E. 1829. Systema mycologicum 3. Gryphiswaldae. 524 p.

Golovin, P. N. 1956. Materialy k monografii mučnisto-rosjanych gribov (semejstvo Erysiphaceae) v SSSR. Acta Inst. bot. Acad. Sci. URSS, ser. II, *10*:309–66.

Gorlenko, M. V. 1959. O prioritete G. S. Nevodovskogo v opisanii novogo vida mučnistorosjanogo griba na dube. Bot. Mater. (Notul. syst. Sect. crypt. Inst. bot. Acad. Sci. URSS) *12*:157–9.

Griffon, E. & Maublanc, A. 1912. Les Microsphæra des chênes. Bull. Soc. mycol. Fr. *28*:88–104.

Jačevskij, A. A. 1927. Karmannyj opredelitel' gribov. Vypusk vtoroj. Mučnisto-rosjanye griby. 626 p. Leningrad.

Klika, J. 1924. Sur l'emplacement systématique du Microsphaera du blance de chêne d'Europe et quelques remarques sur la biologie de cette espèce. Acta bot. bohem. *3*:21–31.

Lanjouw, J. et al. 1956. International code of botanical nomenclature. 338 p. Utrecht.

Mayor, E. 1909. Contribution à l'étude des Erysiphées de la Suisse. Bull. Soc. neuchâtel. Sci. nat. *35*:43-61.

Nevodovskij, G. S. 1952. Griby SSSR (Fungi of URSS) *1*, 4.

Saccardo, P. A. 1886. Sylloge fungorum *4*:44. Patavii.

Salmon, E. S. 1900. A monograph of the Erysiphaceae. Mem. Torrey bot. Cl. *9*:1–292.

Săvulescu, T. & Sandu-Ville, C. 1929. Die Erysiphaceen Rumäniens. Ann. sci. Acad. Haut. Étud. Agron. Bucarest *1*:1–82. 25 pl.

Sawada, K. 1951. Researches on fungi in the Tōhoku district of Japan. I. Erysiphaceae. Bull. Govt. For. Exp. Sta. *50*:97–140, 6 figs.

Tai, F. L. 1946. Further studies on the Erysiphaceae of China. Bull. Torrey bot. Cl. *73*:108–130.

Tulasne, L. R. and C. 1861. Selecta fungorum carpologia *1*. Paris.

Ubrizsy, G. 1946. Adatok a Nyirség lisztharmatgombainak (Erysiphaceae) ismeretéhez. (Contributions to the knowldge of the Erysiphaceae of Nyirség.) Acta mycol. hung. *3*, 1–4:28–33. – Ref. in Rev. Appl. Mycol. *26*:317. 1947.

Vlasov, A. A. 1954. Vozbuditeli mučnistoj rosy duba v evropejskoj časti SSSR. Trud. Inst. Lesa *16*:144–77.

— 1957. Dva vida mučnistoj rosy. Les. Choz. *10*, 2:28.

Wallroth, F. G. 1833. Flora cryptogamica Germaniae, Sect. II. Norimbergae, 923 p.

Microsphaera hypophylla Nevodovskij (*M. silvatica* Vlasov), en eikemjøldoggsopp

En *Microsphaera* med rikelig med cleistothecier er funnet på blad av *Quercus robur* i Norge: Akershus: Ås. Det er vist at soppen er identisk med *M. silvatica* nom. nud., som er vidt utbredt i SSSR og som er beskrevet uten diagnose på latin av Vlasov (1954). En diagnose av Vlasov på russisk er oversatt til engelsk. Forholdet til andre *Microsphaera* spp. er diskutert. Artens utbredelse er skissert. *M. silvatica* er funnet å være et synonym til *M. hypophylla* Nevodovskij. Det sistnevnte, som i 1952 ble publisert med en kort diagnose på latin, er det valide navn. Det er gitt en emendert diagnose på latin.

Plates

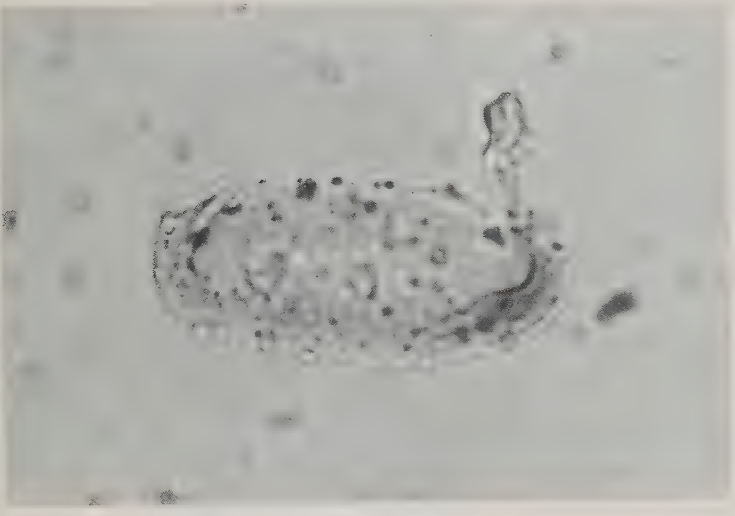

Fig. 1a

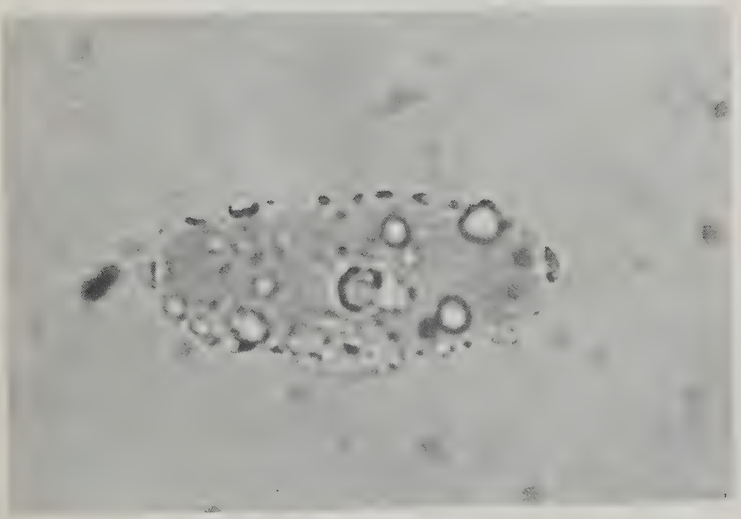

Fig. 1b

Figs. 1a - b: Conidia, × 1700, *Calocladia penicillata* f. *quercus*. Rabenhorst, Fungi europaei, 2032.

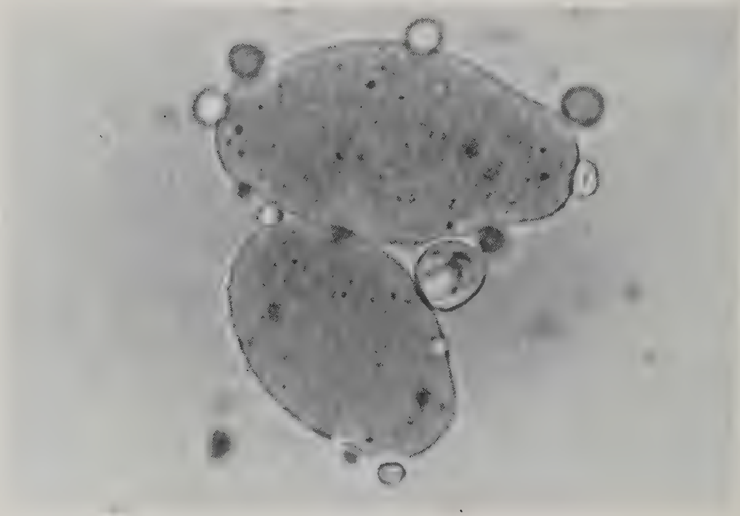

Fig. 2: Conidia, × 1500, *Microsphaera alphitoides.* Norway.

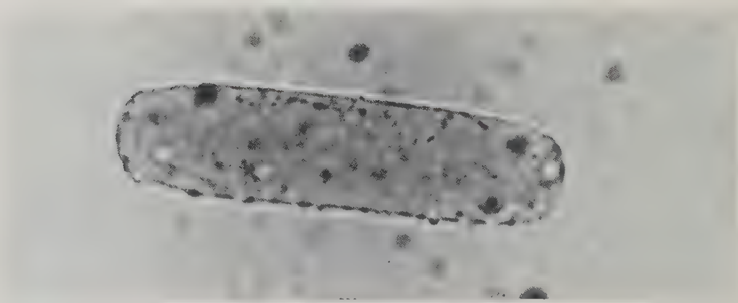

Fig. 3a

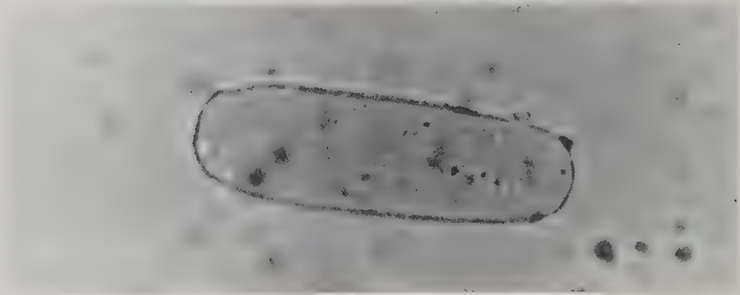

Fig. 3b

Figs. 3 a - b: Conidia, × 1500, *Microsphaera hypophylla (M. silvatica)*. Norway.

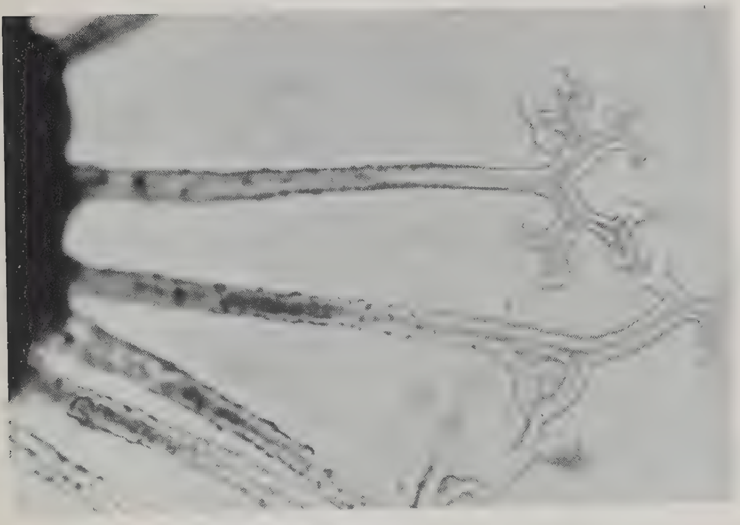

Fig. 4a

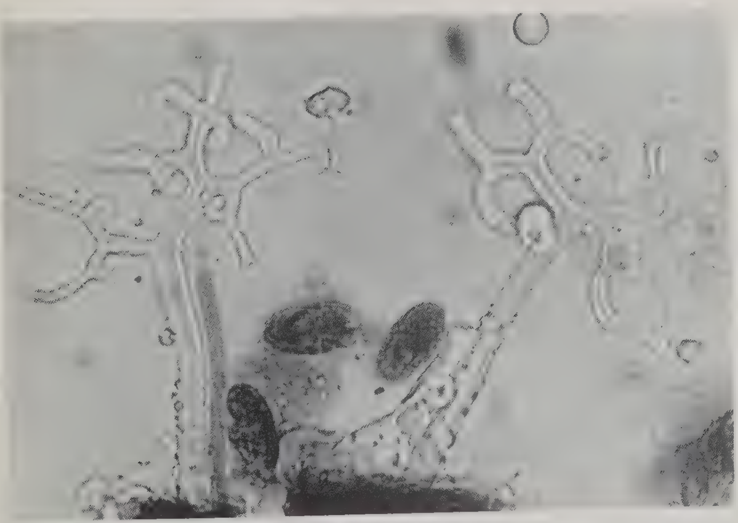

Fig. 4b

Figs. 4 a - b : Appendages, × 700, *Calocladia penicillata* f. *quercus*. Rabenhorst, Fungi europaei, 2032.

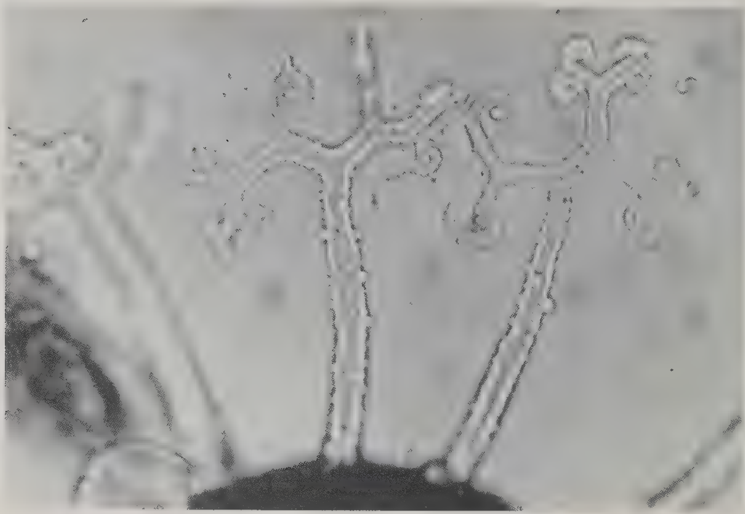

Fig. 4 c: Appendages, × 700, *Calocladia penicillata* f. *quercus*. Rabenhorst, Fungi europaei, 2032. (Same as figs. 4 a - b).

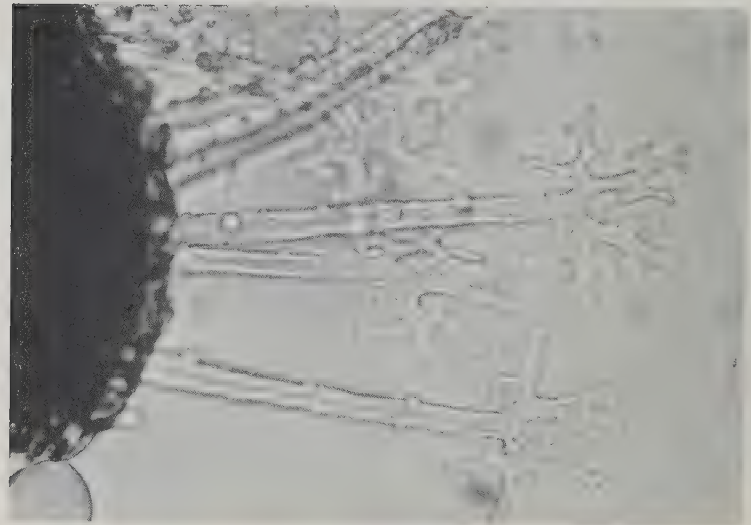

Fig. 5: Appendages, × 700, *Microsphaera alphitoides*. Norway.

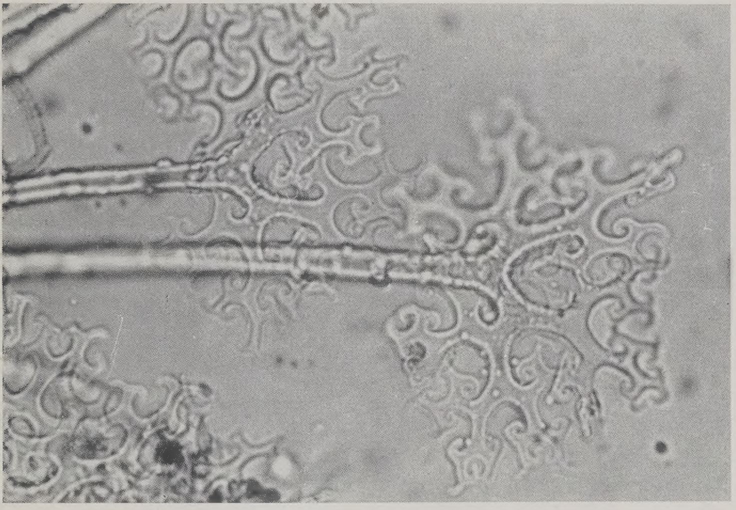

Fig. 6 a: Appendages, × 650, *Microsphaera hypophylla* (*M. silvatica*). Norway.

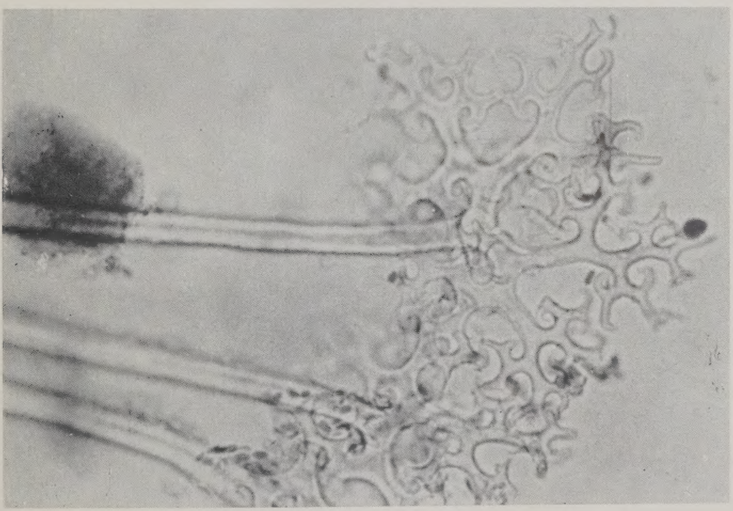

Fig. 6 b: Appendages, × 650, *Microsphaera hypophylla*. Griby SSSR *1*, 4.

Trykt hos J. Chr. Gundersen
Oslo 1961